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U.S. Army Environmental Center

FINAL

PHASE II SUPPLEMENTAL SITE INVESTIGATION OPERATIONS PLAN

WOODBRIDGE RESEARCH FACILITY, VIRGINIA

Prepared By:

EARTH TECH
1420 King Street, Suite 600
Alexandria, Virginia 22314

Prepared For:

U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland 21010

August 1995

Under Contract Number DAAA15-91-D-0009, Delivery Order 0001, Modification 2

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TABLE OF CONTENTS

TABLE OF CONTENTS

Continued

Section **Page No.**

LIST OF FIGURES

Figure No. **Page No.**

LIST OF TABLES

Table No. **Page No.**

LIST OF ACRONYMS AND ABBREVIATIONS

AREE	Areas Requiring Environmental Evaluation
ARL	Army Research Laboratory
BCT	BRAC Cleanup Team
BNA	Base/Neutral Acid
BRAC	Base Realignment and Closure
CAC	Commonwealth Agency Coordinator
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Ac
CERFA	Community Environmental Response Facilitation Act
DOD	Department of Defense
DQO	Data Quality Objective
DSMOA	DOD and State Memorandum of Agreement
EARTH TECH	The Earth Technology Corporation
ELISA	Enzyme Linked Immunosorbent Assay
EMI	Electromagnetic Induction
ENPA	Preliminary Assessment
GPR	Ground Penetrating Radar
IRDMIS	Installation Restoration Data Management Information System
IRP	Installation Restoration Program
NEPA	National Environmental Policy Act of 1969
NVCC	Northern Virginia Community College
OSW	Office of Solid Waste
PCB	Polychlorinated Biphenyls
PIRP	Public Involvement and Response Plan
PO	Project Officer
POC	Point-of-Contact
ppm	Parts per million
QA/QC	Quality Assurance/Quality Control
QCP	Quality Control Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
SSI	Supplemental Site Investigation
SVOC	Semivolatile Organic Compound
TPH	Total Petroleum Hydrocarbon
TSAP	Sampling and Analysis Plan
μg/g	Micrograms per gram
USAEC	U.S. Army Environmental Center
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	Underground Storage Tanks
VADEQ	Virginia Department of Environmental Quality
VDWM	Virginia Department of Waste Management
VEPCO	Virginia Electrical Power Company
VOC	Volatile Organic Compound
WRF	Woodbridge Research Facility

SECTION 1.0
INTRODUCTION

In 1990 the Defense Base Closure and Realignment Act established the formal process to identify those Department of Defense (DOD) facilities which are suitable candidates for realignment. The 1990 Base Closure Act serves to accommodate the reduction in DOD forces by identifying which activities may be relocated and which DOD installations may be permanently closed, eventually allowing real property transfer at the closed installations according to the environmental requirements of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In July 1991 the Army Research Laboratory, Woodbridge Research Facility (WRF), Woodbridge, Virginia, was recommended for closure by 1991 Base Realignment and Closure (BRAC 91). As per BRAC 91, the U.S. Army closed WRF on 16 September 1994 and plans to dispose of the property before the 1 October 1997 deadline.

The U.S. Army Environmental Center (USAEC), Aberdeen Proving Ground, Maryland, directed The Earth Technology Corporation (EARTH TECH) to complete a Supplemental Site Investigation (SSI) of the WRF installation. This Phase II SSI is being conducted as part of the U.S. Army Installation Restoration Program (IRP) with all specific activities and project responsibilities as defined in contract number DAAA15-91-D-0009, Delivery Order 0001, Modification 2. Project-specific administration and technical supervision of this delivery order are provided by USAEC-Base Closure Division.

This document, entitled "Phase II SSI Operations Plan, Woodbridge Research Facility", describes all tasks to be performed in order to further characterize and evaluate certain potentially contaminated sites at the WRF installation. This Operations Plan is prepared, and all activities specified herein are to be completed, in accordance with, the National Environmental Policy Act of 1969 (NEPA) and Army Regulation 200-2.

As part of the IRP Process, an Enhanced Preliminary Assessment (ENPA) was performed to document past activities and existing conditions at WRF. The objectives of the ENPA included identifying and characterizing all Areas Requiring Environmental Evaluation (AREEs) that may require a SI or immediate remedial action, and other actions that may be necessary to address and resolve all identified environmental problems. The results of the ENPA, delivered in March 1992, identified 29 AREEs and provided recommendations for appropriate actions.

In addition to the IRP, the Community Environmental Response Facilitation Act (CERFA) amendment to CERCLA provides a mechanism for installations designated for closure to identify "clean" areas for property transfer purposes. A CERFA report

for the WRF was first published on 8 October 1993, and not only noted the 29 AREEs addressed in the ENPA, but also identified two additional AREEs (AREEs 29 and 30) which will require investigation.

Also, a part of the BRAC process is the development of a BRAC Cleanup Team (BCT) to assist in streamlining cleanup of installations with the underlying goal being the rapid transfer of "clean" properties to the public. This team consists of a DOD representative, an U.S. Environmental Protection Agency (USEPA) representative, and a Commonwealth of Virginia representative. One of the tasks assigned to the BCT is the completion of a "Bottom-Up Review" of all past activities at the installation to identify all possible concerns that may affect property transfer. During the "Bottom-Up Review" for the WRF, the BCT identified additional AREEs which will require investigation.

USAEC identified 22 of the 29 AREEs included in the ENPA as requiring further investigation. These 22 AREEs were sampled between 8 September 1993 and 8 October 1993 in a Preliminary SI. This program will be referred to as the Preliminary SI throughout the remainder of this Operations Plan. The intent of the Preliminary SI was to identify what, if any, contamination exists at the 22 AREEs. The results of this investigation are discussed in the SI Report (EARTH TECH, 1995). After reviewing preliminary findings, the BCT recommended SSI sampling for eight AREEs. A Phase I SSI was completed in August 1994.

The Phase II SSI includes 5 AREEs (14, 22, 18, 20, and 21) that were included in the Preliminary SI and 10 additional AREEs (15, 17, 29, 30, 33, 34, 35, 38, 39, and 40) that have not been part of a previous investigation. Only AREEs 18 and 21 were included in the Phase I SSI. Where relevant to the completion of the investigations detailed in this Operation Plan, information from the Preliminary SI and Phase I SSI has been noted. The AREEs are listed in Table 1-1 (AREEs requiring a Phase II SSI) and shown on Figures 1-1 and 1-2.

The proposed sampling outlined in this Operations Plan will be performed in accordance with the Technical Sampling and Analysis Plan (TSAP, 1995). The analytical program which will complement the field investigation is defined in the Quality Assurance/Quality Control Plan (QA/QCP, 1995).

TABLE 1-1
AREEs REQUIRING A PHASE II SUPPLEMENTARY SITE INSPECTION

AREE No.	Description and Enhanced Preliminary Assessment Summary of Findings	Preliminary Site Inspection and Other Summary of Findings	Media to be Sampled
14	**Oil/Water Separator (Building 211):** Underground storage tank connected to drain in work area in Building 211. Water drains to field east of building.	The separator appeared in good condition. TPH were detected in two soil samples next to the separator. No VOCs or SVOCs were detected in an aqueous sample.	Soil Groundwater
15	**Building 201 PCB Transformer:** Pad mounted transformer tested and removed.	Not part of SI or other Investigation.	Soil
17	**Spill Areas:** Hydraulic fluid (oil) was spilled from a crane and a bulldozer at two locations. Remedial action was taken immediately.	Not part of SI or other investigation.	Soil
18	**Flammable/Battery Storage (Building 204):** Storage building for drums and batteries. Has concrete floor. Current battery storage area has safety shower and drain.	Located and sampled drain outfall. Four soil samples were collected. The AREE 18 manganese range slightly exceeded background and regional USGS ranges. Toluene was detected in a soil sample.	Soil
20	**Former Incinerator:** Metal box was used to burn paper for 1950s to mid 1970s.	No evidence of the former incinerator was encountered during excavations. No samples were collected.	Soil
21	**Former Storage Area:** Site partially covered by present Building 211. Reportedly stored transformers and capacitors in early 1970s.	TPH were detected in four composite soil samples. Subsurface samples were also collected.	Soil
22	**Drainage Ditch:** Oil Spills may have drained to ditch; contamination may have entered ditch from off-site; oil/water separators empty into ditch.	TPH were detected from two upstream sediment samples. TPH were not detected in surface water samples.	Sediment
29	**VEPCO Transformer Spill:** Transformer opposite Building 101 leaked PCB-containing fluid in 1984. Spill and transformer were not part of Enhanced Preliminary Assessment.	Transformer failed and leaked PCB-contaminated fluid. Not part of SI.	Sediment/Soil
30	**Hydraulic Oil Spill:** Not part of Enhanced Preliminary Assessment.	Hydraulic line of crane failed during operation. Fifty gallons of hydraulic oil lost from crane. Not part of SI.	Soil
33	**Bulldozer Fuel Spills:** Not part of Enhanced Preliminary Assessment.	Originally part of AREE 17, BRAC Cleanup Team created this AREE. Not part of SI.	Soil
34	**Hunter Qualification Target Range:** Used once a year to permit hunters to use facility. Not part of Enhanced Preliminary Assessment.	AREE created by the BRAC Cleanup Team to be investigated for presence of spent rounds and collection of samples. Not part of SI.	Soil
35	**Former Antennae Locations:** Not part of the Enhanced Preliminary Assessment.	Antennae sites may have utilized PCB impregnated hose or transformers containing PCBs. Not part of SI.	Soil

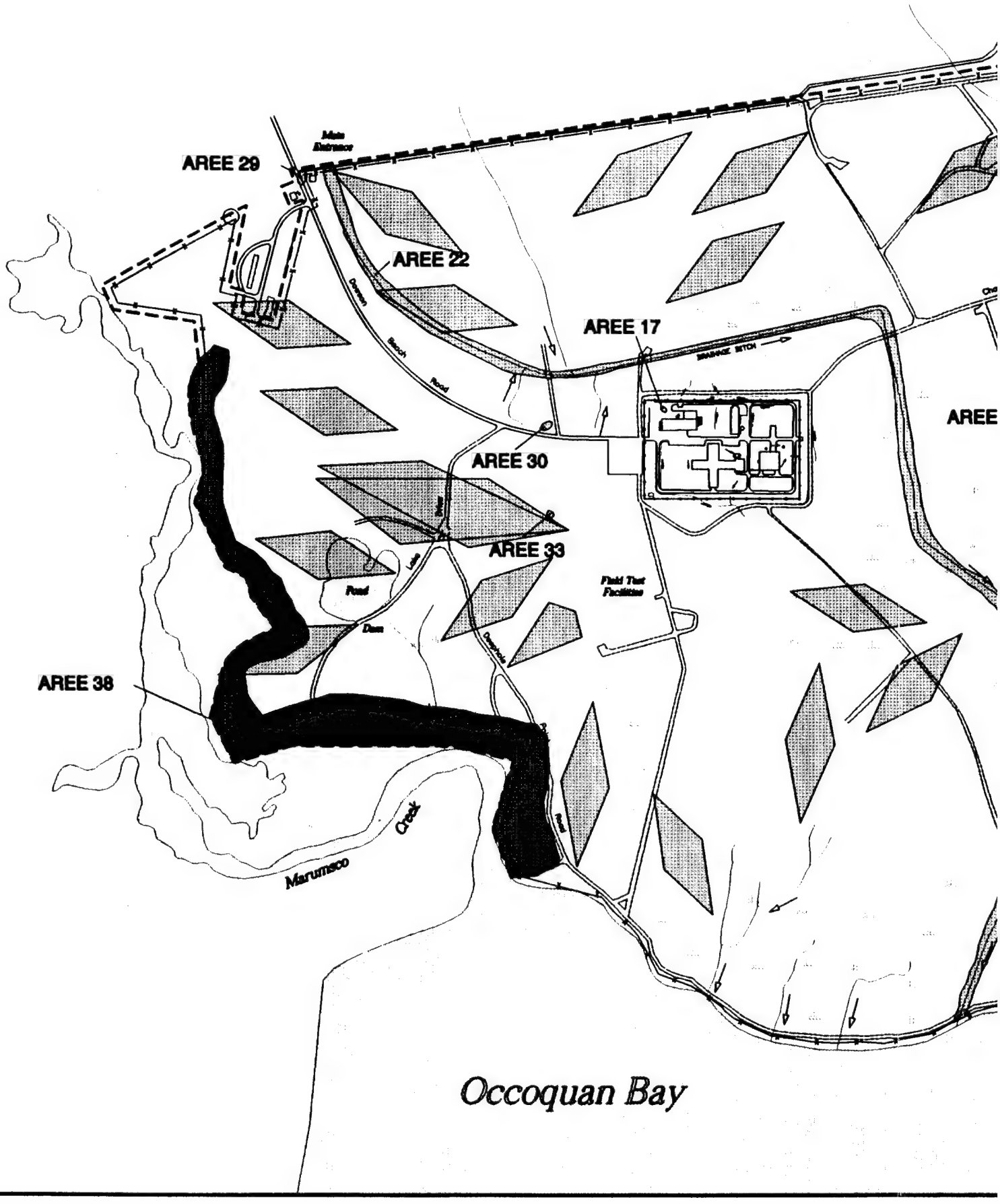
TABLE 1-1
AREEs REQUIRING A PHASE II SUPPLEMENTARY SITE INSPECTION

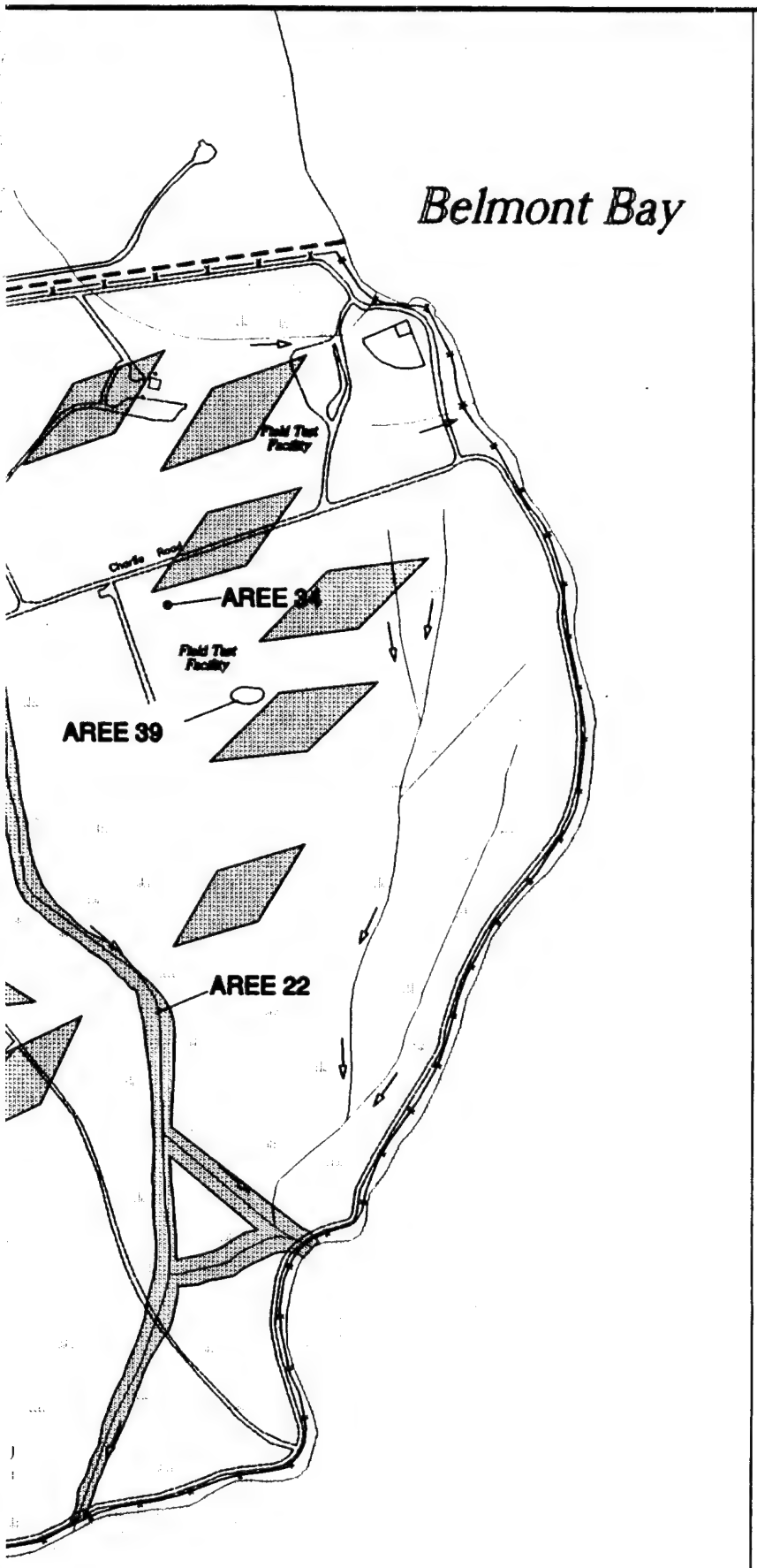
Continued

AREE No.	Description and Enhanced Preliminary Assessment Summary of Findings	Preliminary Site Inspection and Other Summary of Findings	Media to be Sampled
38	**NVCC Study Area:** Not part of the Enhanced Preliminary Assessment.	Community college field study reported mercury contamination in soil samples taken adjacent to facility. Not part of SI.	Sediment/Soil
39	**Debris Piles:** Not part of Enhanced Preliminary Assessment.	BCT created this AREE. Debris piles contain metallic debris, construction material, and soil. Not part of SI.	Soil
40	**Former Water Tower:** Not part of Enhanced Preliminary Assessment.	BCT created this AREE due to concerns that relate to paint-stripping activities at water towers. Not part of SI.	Soil

Key:

NA	=	Not Available
PCB	=	Polychlorinated Biphenyl
TPH	=	Total Petroleum Hydrocarbon
AREE	=	Area Requiring Environmental Evaluation
USGS	=	U.S. Geological Survey
VOC	=	Volatile Organic Compound
SVOC	=	Semivolatile Organic Compound
VEPCO	=	Virginia Electrical Power Company
NVCC	=	Norther Virginia Community College
BRAC	=	Base Realignment and Closure
SI	=	Site Inspection


AREE 29
AREE 22
AREE 17
AREE 30
AREE 33
AREE 38
Main Entrance
Drainage Ditch
Beach Road
Lake Road
Dam
Field Test Facilities
Marumsco Creek
Occoquan Bay



AREE Numbers

17 Hydraulic Oil Spill
22 Drainage Ditch
29 VEPCO Transformer
30 Hydraulic Oil Spill
33 Bulldozer Fuel Spills
34 Hunter Qualification Target Range
35 Former Antenna Fields
38 NVCC Study Area
39 Disposal Piles

Installation Boundary

Site Boundary

Water Flow Direction

AREE 35 Antenna Field

0 350 700

SCALE IN FEET

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FIGURE 1-1

AREE LOCATIONS FOR PHASE II SUPPLEMENTAL SITE INVESTIGATION

SECTION 2.0
PROJECT PLAN AND SCHEDULE

The operations plan will define the relationships and responsibilities of all personnel involved with conducting the environmental investigation at the WRF installation.

2.1 PERSONNEL

A variety of activities must be completed, and several documents must be prepared, to properly complete all tasks identified in the Statement of Work for the Phase II SSI at WRF. EARTH TECH has assembled a project team who will complete the activities identified in the Statement of Work. The members of the EARTH TECH project team and their relationships are presented on Figure 2-1. The specifics of the activities which will be completed by the EARTH TECH team during this project are further explained throughout this Operations Plan.

EARTH TECH typically provides technical direction of a project, on-site management of day-to-day investigation activities, and interpretation, evaluation, and reporting of the data collected. For this Phase II SSI at the WRF installation several subcontractors will be required to complete activities which, although they complement EARTH TECH data collection efforts, are not a part of the EARTH TECH Corporate structure. These subcontracted activities for the WRF Phase II SSI are soil boring and monitor well drilling and installation, geodetic surveying, and chemical and physical analytical services at certified laboratories. EARTH TECH has tentatively identified several qualified potential subcontractors including small disadvantaged businesses in the Commonwealth of Virginia to provide each of the above services. EARTH TECH will follow all appropriate Federal Acquisition Regulations and EARTH TECH's in-house Contractor Purchasing System Review-approved purchasing practices to immediately enter into agreements with qualified, capable firms to provide technical services at WRF.

Figure 2-1 shows the members of the USAEC and their roles on this Phase II SSI project. In addition to the USAEC personnel stationed at the Aberdeen Proving Grounds facility, Mr. Harold Allen, the facility manager for the WRF has been, and will be, an asset to all phases of the USAEC/EARTH TECH data collection efforts. The primary point-of-contact (POC) at Army Research Laboratory (ARL), Adelphi, Maryland for all Phase II SSI activities will be Mr. Robert Craig, P.E. Several additional ARL personnel will also be sources of information to help the USAEC/EARTH TECH data collection efforts, including Mr. John Fuestle and the records/drawing repository staff, to provide additional background information should the need arise.

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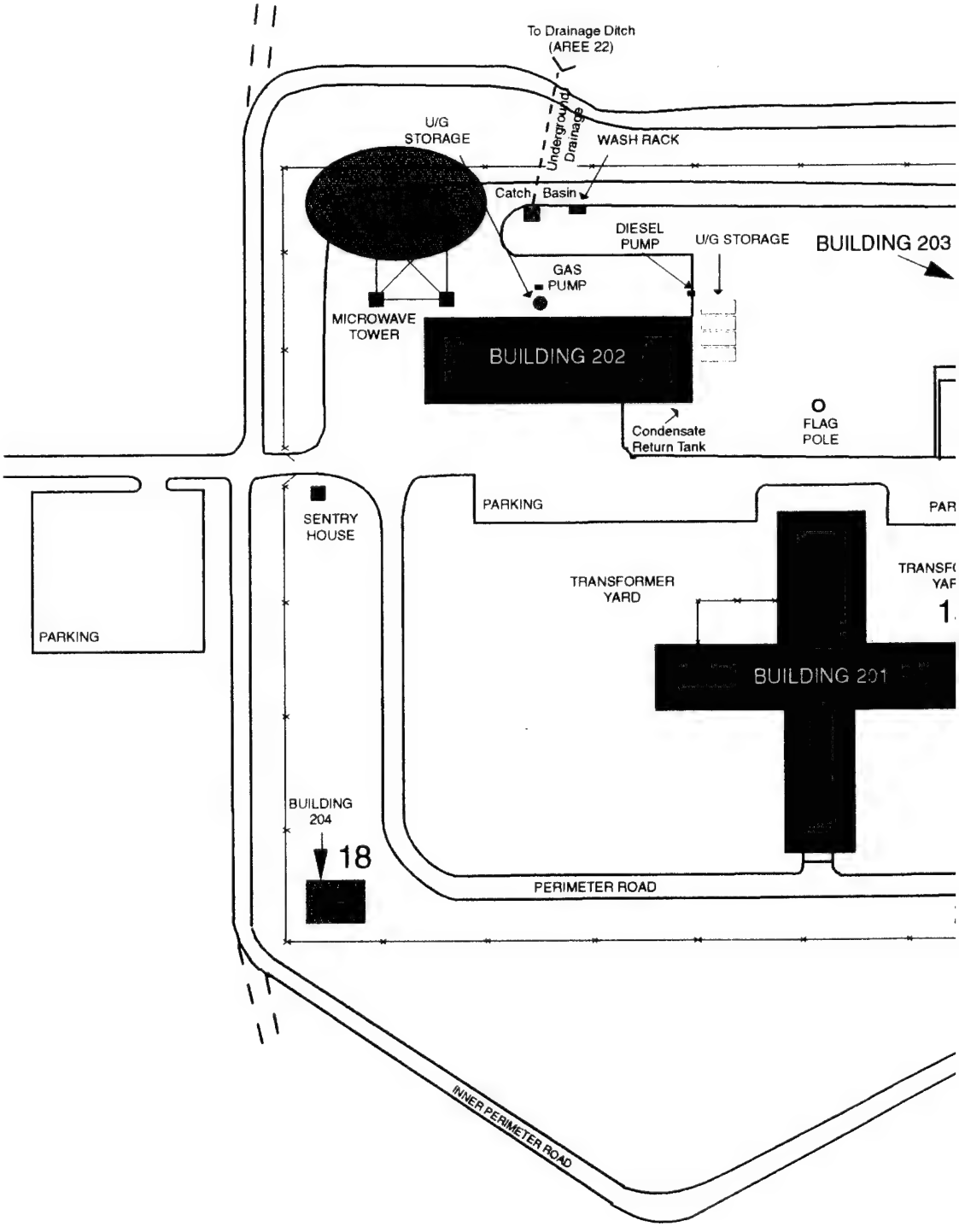


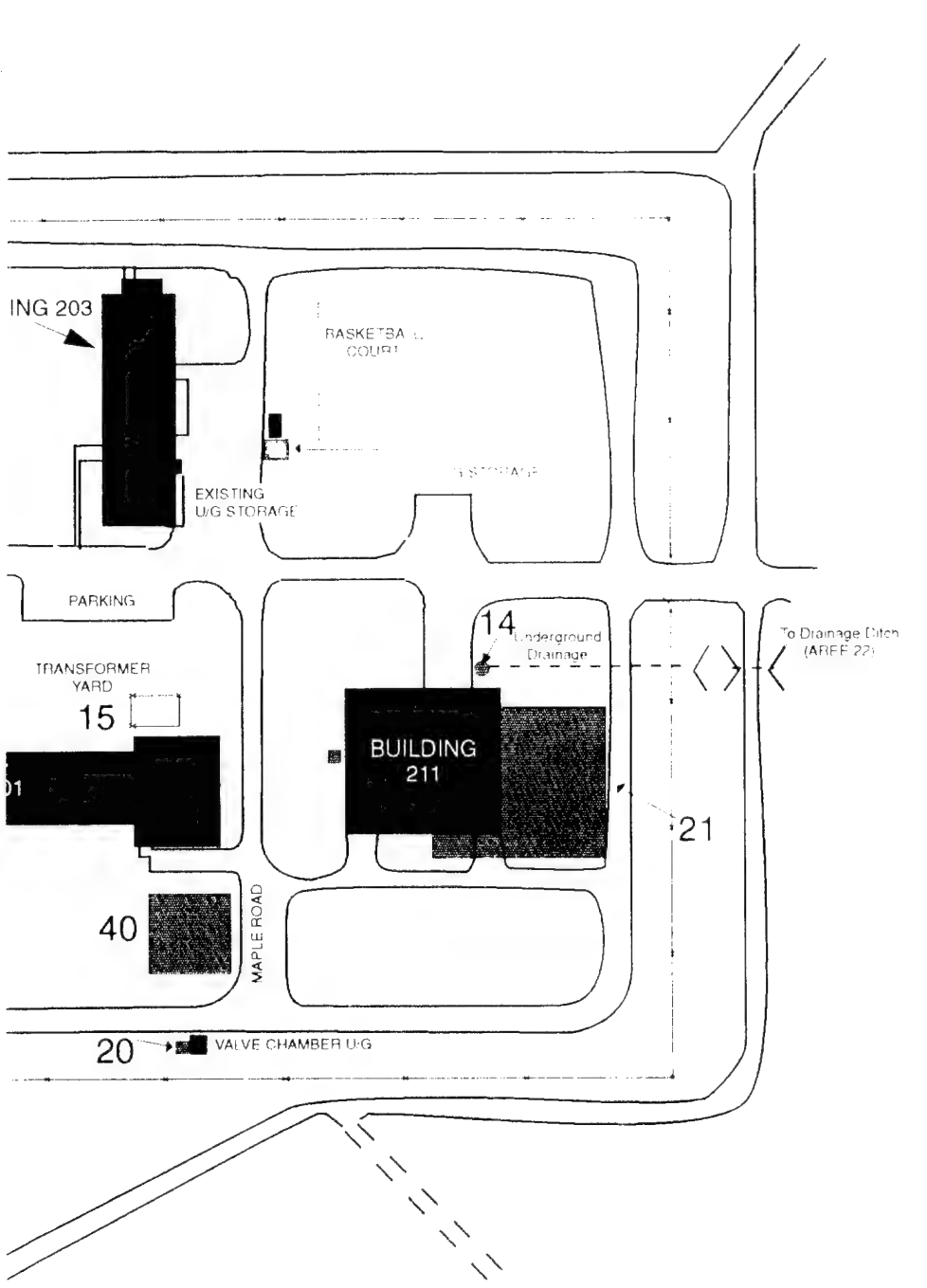
KEY

Fence

6A AREE Number

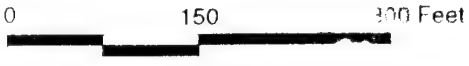
AREE

Outfall



AREE NUMBERS

14. Oil/Water Separator
15. Former PCB Transformer
17. Petroleum Spill Area
18. Flammable Storage
20. Former Incinerator
21. Former Storage Area
22. Drainage Ditch
40. Former Water Tower



NOTE: SEE FIGURE 1-1 FOR AREAS REQUIRING ENVIRONMENTAL EVALUATION OUTSIDE OF MAIN COMPOUND

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FIGURE 1-2

Woodbridge Research Facility
Areas Requiring Environmental Evaluation
MAIN COMPOUND MAP

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Organizational
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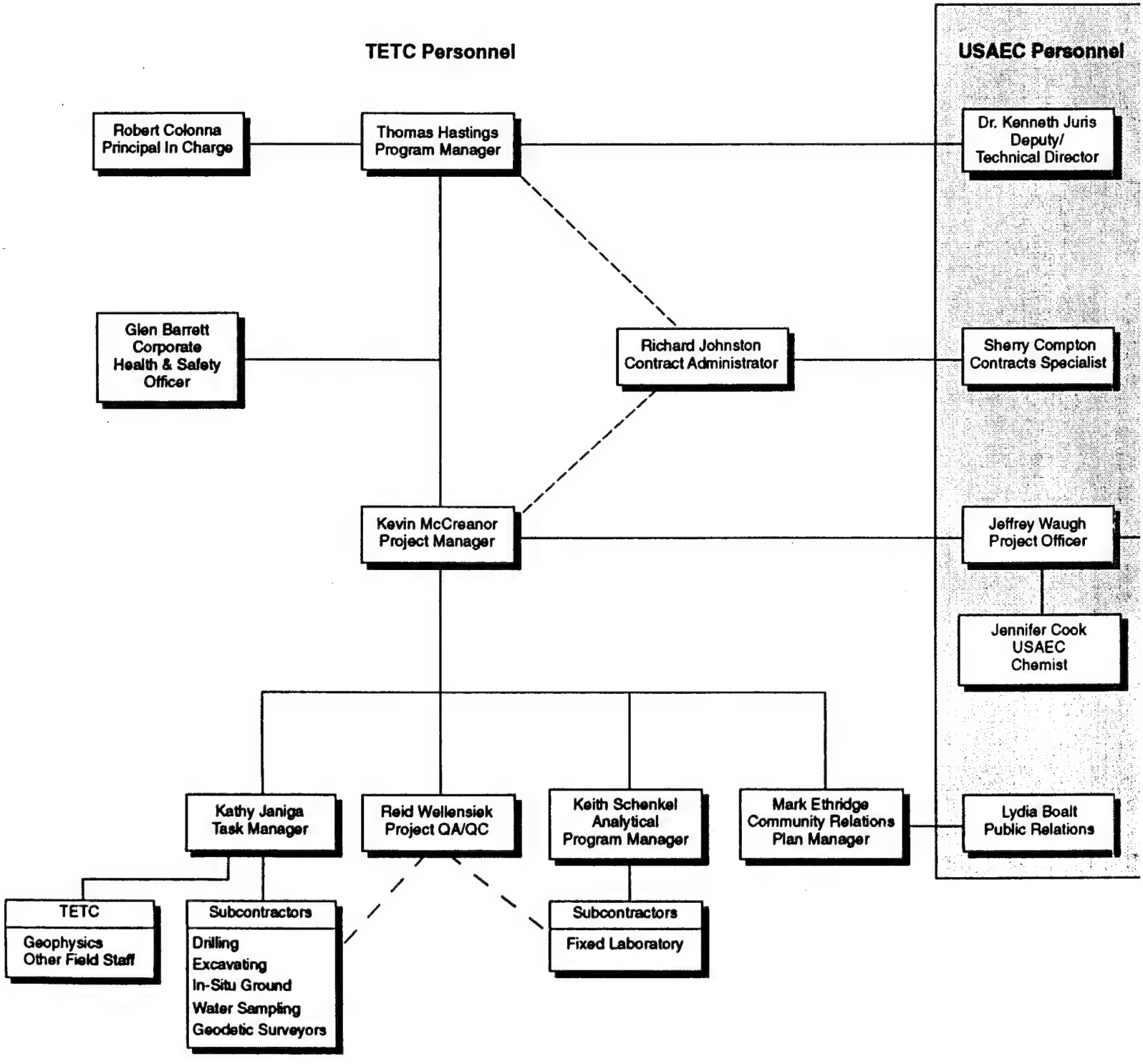

ıl Structure
Supplemental Site Inspection

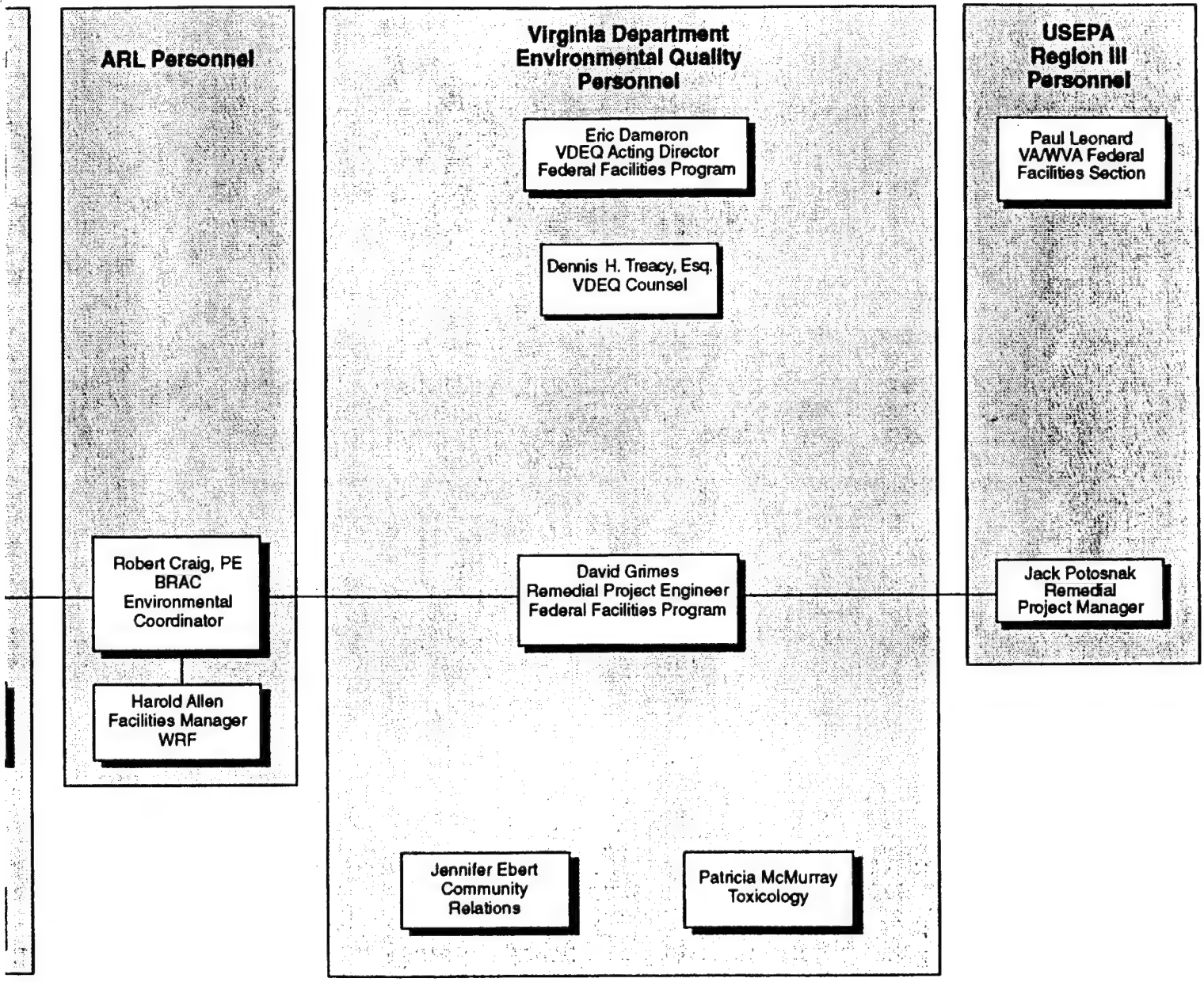

FIGURE 2-1

Organizational Structure

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According to the DOD and State Memorandum of Agreement (DSMOA) signed in 1990, the Commonwealth designated the Virginia Department of Waste Management (VDWM) as the lead Commonwealth agency. Since the signing of this document, several Virginia environmental regulatory agencies including the VDWM were consolidated into the Virginia Department of Environmental Quality (VADEQ). The VADEQ, Waste Division has been retained as the lead Commonwealth regulatory component for the DSMOA for the Phase II SSI of this installation.

As the lead Commonwealth agency, VADEQ shall coordinate among other Commonwealth agencies to represent a single Commonwealth position as to remedial/removal actions at each installation. The VADEQ designated Durwood Willis, VADEQ BRAC Program Manager as the Commonwealth Agency Coordinator (CAC) who shall be the lead technical representative for remedial program management activities. Dennis H. Treacy, Esq. has been designated the VADEQ counsel for matters arising from the remedial program management activities as specified in the implementation plan of the Cooperative Agreement. David Grimes is the Remedial Project Manager for VADEQ with responsibility for WRF.

The USEPA will also be involved during all Phase II SSI activities. WRF is located in USEPA Region III with the designated POC being Mr. Jack Potosnak.

The USAEC Project Officer (PO), the ARL POC, and the CAC shall be the primary POCs to coordinate the remedial investigation and necessary removal program at WRF, including the resolution of disputes.

It is the intention of the parties that all disputes shall be resolved at the lowest possible level of authority as expeditiously as possible within the following framework. All timeframes for resolving disputes below may be lengthened by mutual consent.

1. Should the PO and CAC be unable to agree, the matter shall be referred in writing as soon as practicable but in no event to exceed ten (10) working days after the failure to agree, to the installation commander and the chief of the designated program office of the VADEQ or their mutually agreed upon representatives designated in writing.

2. Should the installation commander and the chief of the designated program office of the VADEQ, or their mutually agreed upon representatives designated in writing, be unable to agree within ten (10) working days, the matter shall be elevated to the head of the VADEQ and a counterpart member of the lead Service involved who shall be a general/flag officer or a member of the senior executive service.

3. Should the head of the VADEQ and the counterpart DOD representative fail to resolve the dispute within 20 working days the matter shall be referred to the Governor and the Service Secretary concerned for resolution.

It is the intention of the parties that all disputes shall be resolved in this manner. Alternative dispute resolution methods may be used. In the event that the Governor and the Service Secretary are unable to resolve a dispute, the Commonwealth retains any enforcement authority it may have under Commonwealth and Federal law.

2.2 PROJECT SCHEDULE

The Phase II SSI activities and their related documentation are to be completed as a sequence of activities. Figure 2-2 presents the overall deliverable schedule. This Operations Plan is one of several documents created to prepare a focused objective for the Phase II SSI at WRF. A TSAP was prepared to describe field sampling procedures for all the activities proposed in this Operations Plan. The QA/QCP describes the analytical program for this investigation.

These additional documents are being prepared to complement the Operations Plan and refine the focus of the overall project. A Management Resource Utilization Plan is projected to define those resources available to USAEC from EARTH TECH and to assure proper distribution of those resources over the projected schedule. The Final Health and Safety Plan has been accepted and identifies the health standards and safety procedures which are to be followed throughout the completion of the project. A Public Involvement and Response Plan (PIRP) was prepared to identify all relevant community and agency participants to the USAEC/EARTH TECH at WRF.

The Operations Plan contains a summary of past investigations, identification of project goals, and a presentation of methods and controls to achieve the project goals. The Phase II SSI activities within this Operations Plan are designed to comply with USEPA guidance for conducting a SSI.

The schedule for the field data collection projected to be included in the Phase II SSI is shown on Figure 2-3. The investigative process is to follow a sequence of collection of field data, evaluation of the collected data, and assessment of the applicability of the data to fully characterize the environmental conditions at particular locations at the WRF installation.

All activities included in the Phase II SSI at the WRF installation will be summarized in reports which will be prepared following the completion of the field activities. These reports will present the data in the format most appropriate for proper description of the environmental condition of each site investigated, including quantification of any contamination identified at the site.

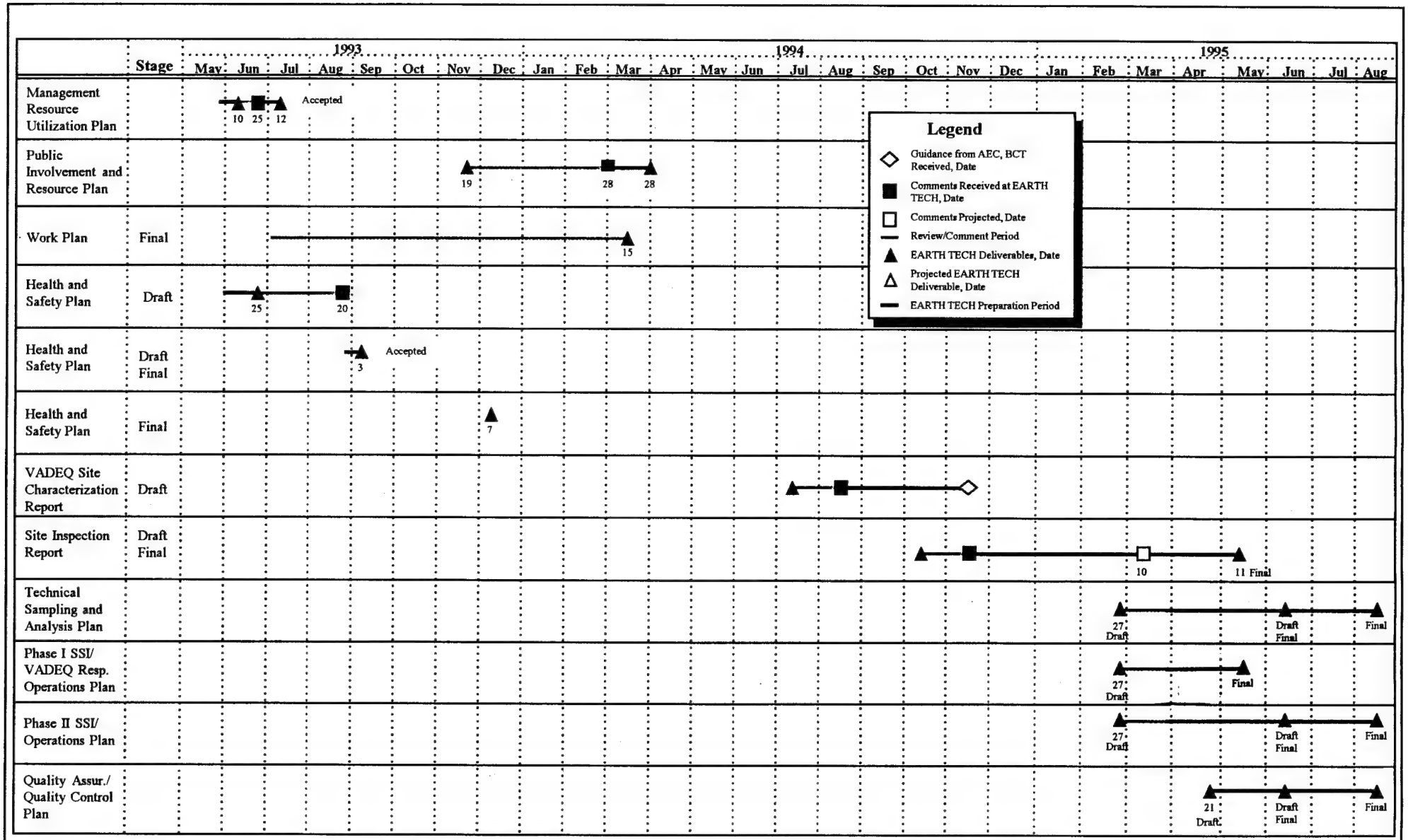

FIGURE 2-2

Woodbridge Research Facility
Supplemental Site Investigation
Deliverable Schedule

#SCHEDULE.2-2

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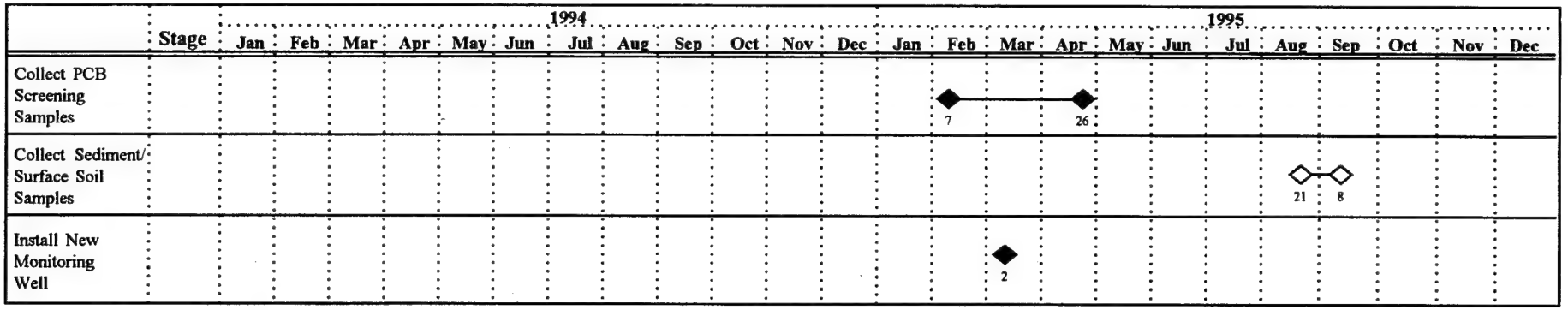

Legend

- Actual Start Date
- Approximate Start Date

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FIGURE 2-3

Woodbridge Research Facility
Phase II SSI Field Program Schedule

#SCHEDULE 23B

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2.3 OPERATIONS PLAN RATIONALE

2.3.1 Data Quality Objectives (DQOs)

Data quality objectives (DQOs) are qualitative and quantitative statements developed by data users to specify the quality of data necessary from field and laboratory data collection activities to support specific decisions or regulatory actions. The DQOs describe what data are needed, why the data are needed, and how the data will be used to address the problem being investigated. DQOs also establish numeric limits for the data to allow the data user (or reviewers) to determine whether data collected are of sufficient quality for use in their intended application. DQOs are also discussed in the QA/QC Plan (EARTH TECH, 1995).

2.3.1.1 Project DQOs

Data needs for the project include both data generated during screening measurements and data of a sufficient quality that may be used for a full site characterization which may eventually support a Risk Assessment. Sufficient quality and types of information have to be collected so that the data can be included in the IRP database, the Installation Restoration Data Management Information System (IRDMIS).

Data which were collected as part of the Preliminary SI were analyzed by Level I and III protocols as described in the QA/QC Plan (EARTH TECH, 1995). These results were used for screening purposes and for initial site characterization. Field tests and observations were conducted initially at many sites providing Level I data. A fixed laboratory was used to analyze all water and soil samples collected by USAEC-approved methods (Level III).

Data to be collected for the SSI will be analyzed by USEPA Level I and III protocols as described in QA/QC Plan (EARTH TECH, 1995). All liquid and solid samples collected during SSI field activities will be shipped to a fixed laboratory for chemical analysis by USAEC-approved methods which satisfy USEPA Level III requirements. These analytical methods and the results for the samples to be collected at WRF for these analyses will be of a sufficient level of quality to achieve both USAEC and USEPA criteria for data quality necessary to support environmental characterization and assessment of risk for a site. These data will be reviewed and validated according to the guidance in the QA/QC Plan.

2.3.2 Operations Plan Tasks

The proposed activities for each AREE included in this Operations Plan are identified on Table 2-1.

TABLE 2-1
SUMMARY OF PROPOSED ACTIVITIES

Activity	AREEs														
	14	15	17	18	20	21	22	29	30	33	34	35	38	39	40
WATER SAMPLING															
Groundwater via Existing Wells															
Groundwater via New Wells	×														
Surface Water															
Other Liquid															
SEDIMENT/SOIL SAMPLING															
Sediment								×					×		
Surface Soil[1]		×	×		×	×			×	×	×	×			×
Shallow Soil via Hand Auger[2]														×	
Subsurface Soil via Excavation															
Subsurface Soil via Drilling Operations	×			×											
FIELD OPERATIONS															
Geophysics/Utility Clearance	×			×											
Excavation															
Borehole Installation	×														
Well Installation	×														
Aquifer Testing	×														
Geodetic Surveying	×	×	×	×	×	×		×	×	×	×	×	×	×	×
Site Restoration	×			×	×										
PCB Screening		×	×			×	×	×				×		×	

Key: AREE = Areas Requiring Environmental Evaluation
PCB = Polychlorinated Biphenyl

Note: × = Proposed Remedial Investigation, Supplemental Site Inspection, or Virginia Department of Environmental Quality Response Plan Activities.

[1] Surface soil samples consist of those samples collected less than 2 feet below ground surface.
[2] Shallow soil samples consist of those samples collected between 2 and 6 feet below ground surface.

RATIONALE

Phase II SSI activities are to be completed at AREEs 14, 15, 17, 18, 20, 21, 22, 29, 30, 33, 34, 35, 38, 39, and 40. AREEs 14, 18, 20, 21, and 22 were investigated as part of the Preliminary SI. The remaining AREEs have not been previously investigated. Due to the presence or suspected presence of polychlorinated biphenyls (PCBs) at AREEs 15, 17, 21, 22, 29, 35, and 39, PCB field screening will take place.

METHODOLOGY

Throughout all phases of the Phase II SSI, the nature and extent of known or suspected contaminants, their sources, the media impacted by the contamination, and the fate and transport mechanism for contaminant movement will be investigated using a variety of techniques, as summarized below.

- ★ ***Water Sampling***. Samples will be collected from the groundwater to determine the extent and concentration of contaminants as required to determine site-specific conditions.

- ★ ***Sediment/Soil Sampling***. Soil sampling will be conducted to define site lithology and the depth, areal extent, and concentration of soil contaminants.

- ★ ***Borehole/Well Installation***. Boreholes and/or monitoring wells will be installed for the collection of soil samples to document hydrologic conditions and lithology, and to allow for chemical analysis of soil and groundwater. This activity will better define the nature and extent of contamination at a site and provide reproducible sampling locations which may be required for future investigations or actions.

- ★ ***Geodetic Surveying***. A state-certified land surveyor will perform a geodetic survey to record the locations of newly installed wells and boreholes. The locations of all sampling locations will be surveyed. The elevations and locations will be recorded on project and site-specific maps. These data which will provide a permanent record of sampling locations will be included in the IRDMIS map file.

- ★ ***Geophysical Surveys***. Wherever necessary, geophysical investigations will be conducted. Magnetometer and electromagnetic induction (EMI) surveys will be used to clear the sites for drilling. At some sites, the magnetometer and EMI surveys will also be used to identify potential locations of buried ferrous objects, such as drums. Ground penetrating radar (GPR) will be used at some sites to locate trenches, disposal pits, non-ferrous pipelines or underground storage tanks (USTs), and other disturbed areas.

★ ***Polychlorinated Biphenyl Screening***. Field test kits will be used to determine the extent of PCB contamination throughout the facility. The test kits are based on an Enzyme Linked Immunosorbent Assay (ELISA). Ten percent of the samples will be sent to a fixed laboratory for confirmation.

SECTION 3.0
SITE EVALUATION FOR PHASE II SSI

The following subsections briefly describe the site history, extent of known contamination and proposed sampling activities and analysis at each AREE included in the Phase II SSI. Table 3-1 summarizes all proposed media sampling and parameters included in the sampling program at each AREE. Most of the AREEs discussed only include surface soil sampling. Surface soil samples are good indicators if the area is affected by a spill as are many of the AREEs. If the surface soil is contaminated other media will be recommended for further sampling. Figures 3-1 and 3-2 depict AREEs and associated sampling to be conducted in the Phase II SSI. Background samples are shown on Figure 3-2 in undisturbed areas.

The IRDMIS map file included in Appendix A identifies the Phase II SSI sample locations which were estimated from a map with accuracy unknown. The coordinates will be updated after the surveying is completed.

3.1 AREE 14 - OIL/WATER SEPARATOR

3.1.1 Site Description and History

AREE 14 consists of the oil/water separator north of Building 211. The separator receives drainage from the work areas inside Building 211 and discharges to the grassy area to the east of the fenced compound. Based on the PA, there have been no spills reported from the work areas inside Building 211, and no significant amounts of hazardous liquids are believed to have been handled there (Weston, 1992). The location of AREE 14 is depicted on Figure 3-1.

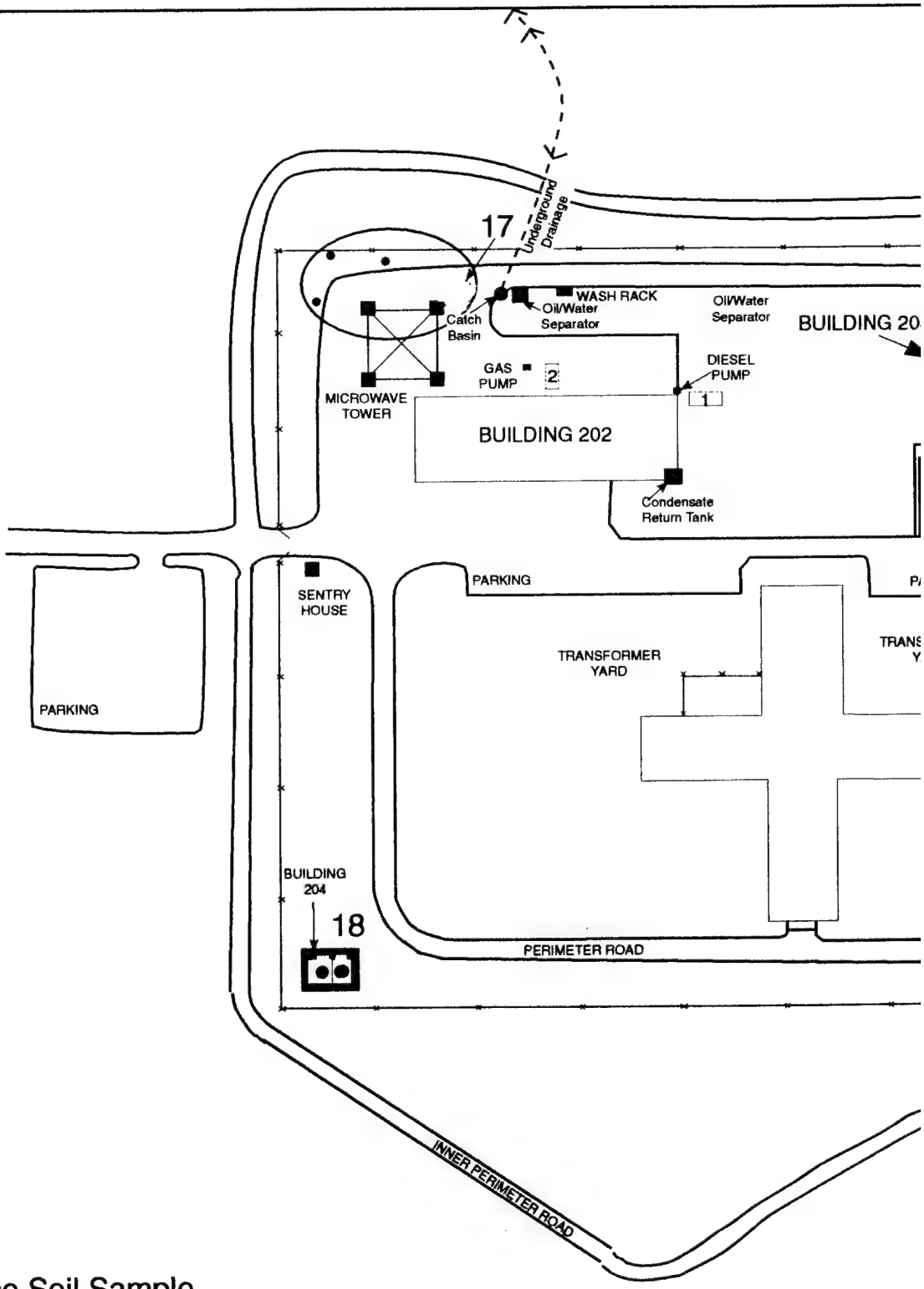
3.1.2 Extent of Contamination

AREE 14 was included in the initial SI field work completed by EARTH TECH in the Fall of 1993. Four sides of the separator were excavated, and the separator appeared in good condition. Two soil samples were collected from the sides of the separator and analyzed for total petroleum hydrocarbon (TPH), volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). TPH were detected in the subsurface soil at 55 and 65 parts per million (ppm). No VOCs or SVOCs were detected in the soil. Sediment samples collected at the separator outfall contained TPH at 51 and 53 ppm. Surface water samples collected at the separator outfall contained trace phthalates.

TABLE 3-1
PROPOSED SAMPLING REQUIREMENTS

Soil Samples	PCB Screening	Metals	BNA	PCB/ Pesticide	Dioxin	VOC	TPH
Background		3	3	3	3	3	
AREE 14		2	2	2		2	2
AREE 15	5	1	1	1		1	1
AREE 17		3	3	3		3	3
AREE 18		2	2	2		2	2
AREE 20		4	4	4	4	4	4
AREE 21	10	1	1	1		1	1
AREE 22	28	0	0	0		0	0
AREE 29	4	3	3	3		3	3
AREE 30		4	4	4		4	4
AREE 33		4	4	4		4	4
AREE 34		4	4	4		4	4
AREE 35	125	12	12	12		12	12
AREE 38		5	5	5		5	5
AREE 39	3	5	5	5		5	5
AREE 40		1	1	1		1	1
Subtotal	175	54	54	54	7	54	51
Quality Control		16	16	16	2	36	15
Total Soil	175	70	70	70	9	90	66
Groundwater Samples	**PCB**	**Metals**	**BNA**	**Pesticide**	**Dioxin**	**VOC**	**TPH**
AREE 14	1	1	1	1		1	1
Quality Control	1	1	1	1		3	1
Total Water	2	2	2	2	0	4	2

Key:
PCB = Polychlorinated Biphenyl
BNA = Base/Neutral Acid
VOC = Volatile Organic Compound
TPH = Total Petroleum Hydrocarbon
AREE = Areas Requiring Environmental Evaluation



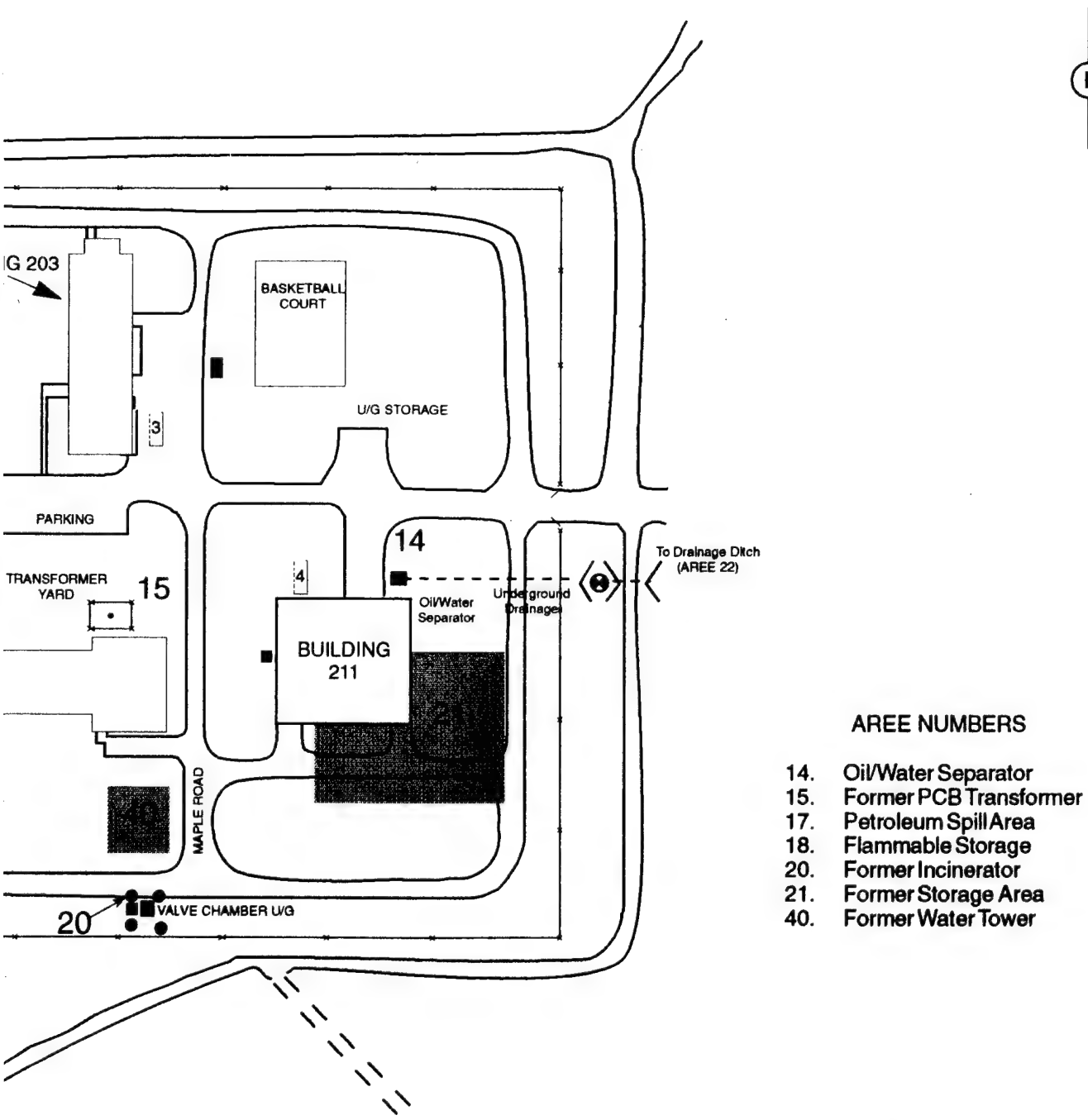
KEY

- Fence
- 14 AREE Number
- Outfall
- Proposed Surface Soil Sample
- Proposed Monitoring Well

Existing USTs

(1) One existing 2,000-gallon UST.
(2) One existing 1,000-gallon UST.
(3) One existing 10,000-gallon UST.
(4) One existing 1,500-gallon UST.

WOODBRIDGE/P2.3-1 ARRE & Addtl Samp Loca



AREE NUMBERS

14. Oil/Water Separator
15. Former PCB Transformer
17. Petroleum Spill Area
18. Flammable Storage
20. Former Incinerator
21. Former Storage Area
40. Former Water Tower

0 150 300 Feet

Scale

NOTE: SEE FIGURE 3-2 FOR AREAS REQUIRING ENVIRONMENTAL EVALUATION OUTSIDE OF MAIN COMPOUND

EARTH TECH

FIGURE 3-1

Woodbridge Research Facility
Proposed Sampling Locations for
Phase II Supplemental Site Investigation
(Main Compound)

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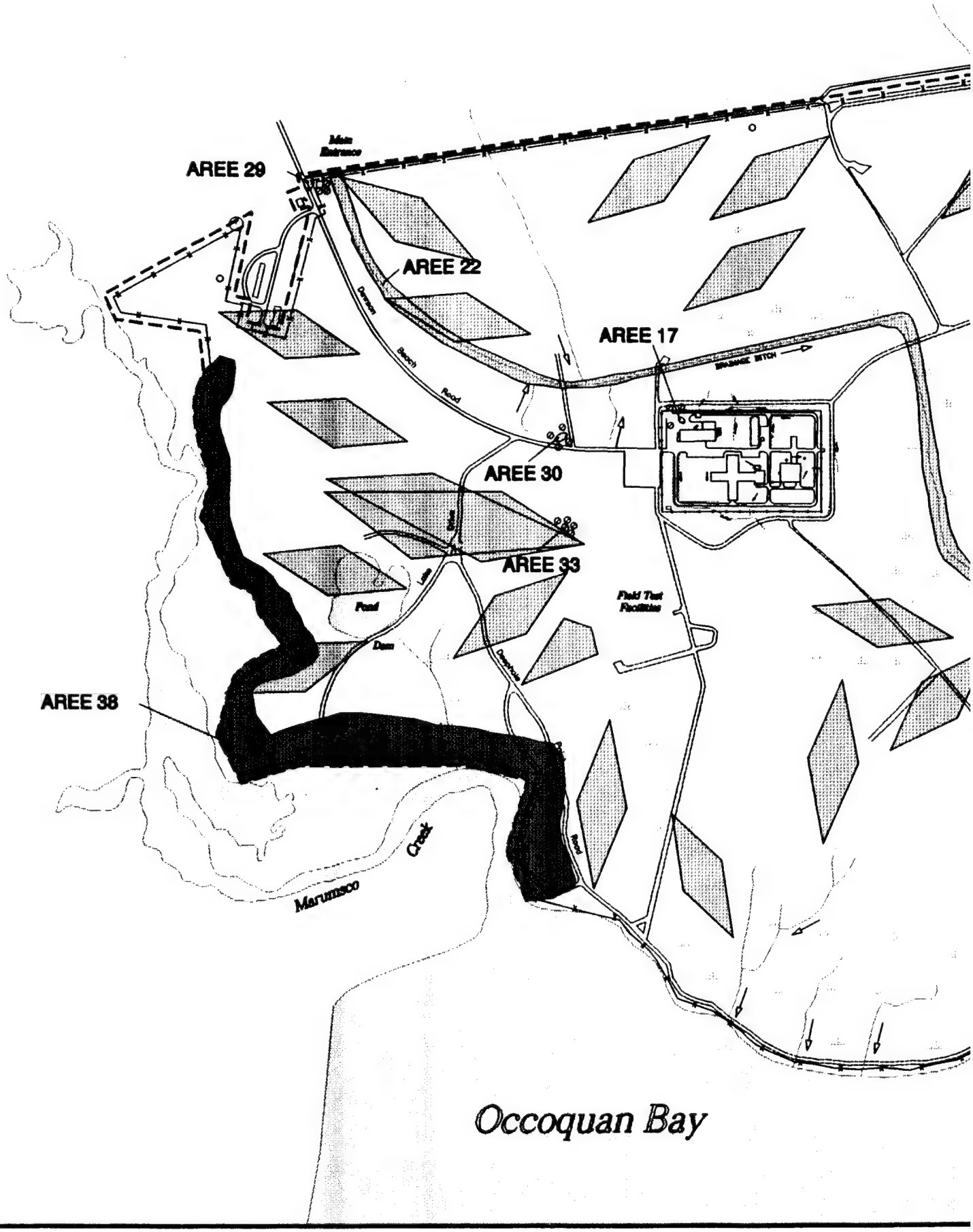
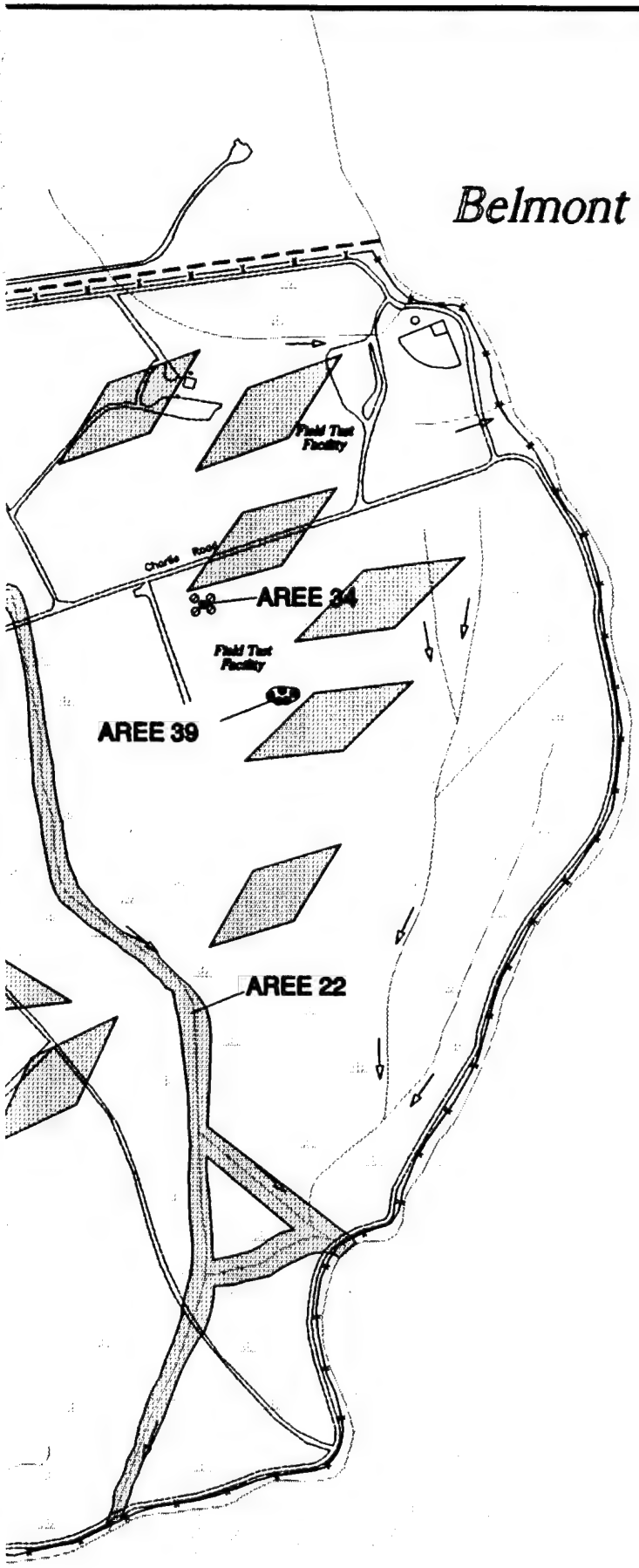

AREE 29
AREE 22
AREE 17
AREE 30
AREE 33
AREE 38
Main Entrance
Dumpster
Beach Road
DRAINAGE DITCH
Lake
Pond
Dam
Field Test Facilities
Creek
Occoquan Bay



AREE Numbers

17 Hydraulic Oil Spill
22 Drainage Ditch
29 VEPCO Transformer
30 Hydraulic Oil Spill
33 Bulldozer Fuel Spills
34 Hunter Qualification Target Range
35 Former Antenna Fields
38 NVCC Study Area
39 Disposal Piles

Installation Boundary

Site Boundary

Water Flow Direction

Surface Soil Sample

Subsurface Soil Sample

Background Sample

AREE 35 Antenna Field

0 350 700

SCALE IN FEET

EARTH TECH

FIGURE 3-2

PROPOSED SAMPLE LOCATIONS FOR PHASE II SUPPLEMENTAL SITE INVESTIGATION

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3.1.3 Proposed Sampling Activities and Analysis

Due to detected organics in the outfall area, additional sampling is proposed. One boring will be completed at the discharge point immediately to the east of the fence. Two subsurface soil samples will be collected from the borehole for lithologic logging and chemical analysis. The soil samples will be analyzed for VOC, PCB/pesticide, base/neutral acid (BNA), TPH and metals analysis. The samples for chemical analysis will be collected at the depth of the bottom of the oil/water separator and at the groundwater interface. The borehole will extend approximately seven feet into the saturated soil at which depth a monitor well will be constructed. Upon completion of well construction and development, the newly installed well will be sampled. The groundwater collected from the new well will be analyzed for metals, PCB/pesticide, BNAs, VOCs, and TPH.

3.2 AREE 15 - BUILDING 201 PCB TRANSFORMER

3.2.1 Site Description and History

All power distribution transformers at the WRF were tested for PCBs in July and August 1990. Of the eight transformers tested, only one was found to contain PCBs at a concentration in excess of 9 ppm. The transformer located at the northeast corner of Building 201 contained PCB-1260 at a concentration of 565,800 ppm.

In December 1992, this transformer, plus associated PCB-contaminated concrete and PCB-contaminated soil, was removed and replaced with a PCB-free replacement transformer placed on a new PCB-free concrete pad.

3.2.2 Extent of Contamination

The extent of contamination, if any exists, is unknown at AREE 15.

3.2.3 Proposed Sampling Activities and Analysis

AREE 15 will be included in the PCB screening as discussed in Section 4.0. One confirmation soil sample will be collected and sent to the laboratory for analysis of VOCs, BNAs, TPH, PCB/pesticides, and metals. AREE 15 sample location is shown on Figure 3-1.

3.3 AREE 17 - HYDRAULIC OIL SPILL AREA

3.3.1 Site Description and History

In April 1989, a hydraulic oil spill occurred north of Building 202 when a check valve was left open on a crane's hydraulic system. Approximately 100 to 150 gallons of No. 2 hydraulic oil leaked onto the soil. Approximately 40 to 60 tons of contaminated soil was excavated, placed on absorbent blankets, and incinerated offsite. No

previous environmental investigations have been conducted at this site. AREE 17 is depicted on the main compound map presented as Figure 3-1.

3.3.2 Extent of Contamination

Due to quick remedial action, it is unlikely that any significant residual contamination remains, however, the extent of contamination, if any, is unknown at AREE 17. PCB contamination was found in this area (AREE 11) in samples collected during the Preliminary SI.

3.3.3 Proposed Sampling Activities and Analysis

Stressed vegetation is apparent approximately 100 feet north of the microwave tower. At three locations in the immediate vicinity of the stressed area, surface soil samples will be collected. The soil samples will be analyzed for VOCs, BNAs, TPH, PCB/pesticides, and metals. The proposed sample locations for AREE 17 are depicted on the base-wide map presented as Figure 3-2.

3.4 AREE 18 - FLAMMABLE/BATTERY STORAGE (BUILDING 204)

3.4.1 Site Description and History

Building 204 is a small two-room concrete-floored structure used to store flammable materials in one room and vehicle batteries in the second room. The flammable storage room has no drain and no curb at the door. The battery room has a safety shower and drain in one corner. The shower does not have a curb which potentially could allow any acid spillage to flow into the drain. The drain discharges to a gravel pit located approximately 5 feet below ground surface. The gravel pit was uncovered during the SI and two subsurface and two surface soil samples were obtained. AREE 18 is depicted on Figure 3-1.

3.4.2 Extent of Contamination

Four soil samples were collected and analyzed for VOCs, BNAs, and metals. Manganese was detected slightly exceeding background and regional U.S. Geological Survey (USGS) ranges. Toluene was also detected in one surface soil sample at 0.00310 micrograms per gram (μg/g). No other VOCs nor any SVOCs were detected in soil samples.

3.4.3 Proposed Sampling Activities and Analysis

Battery acid spills may have affected the soil beneath Building 204. Two subsurface soil samples will be obtained from beneath the concrete floor at Building 204. One soil sample will be obtained beneath the former flammable materials storage room and one sample beneath the vehicle battery storage room. The samples will be analyzed

for VOCs, metals, BNAs, PCB/pesticides, and TPH. Proposed sampling locations are indicated on Figure 3-1.

3.5 AREE 20 - Former Incinerator

3.5.1 Site Description and History

A small incinerator (approximately 8 feet by 5 feet by 6 feet high) was located in the south area of the fenced compound. The incinerator was used for burning classified documents from the 1950s until 1970 and was removed in 1972. The unit was mounted on a concrete base and consisted of an asbestos lining between inner and outer metal walls, a dust collector in the smoke stack to prevent release of ash out the stack, and a 100-gallon aboveground tank for heating oil, which was used as a fire starter. The incinerator was used frequently, sometimes daily. The ash was shoveled into drums and was disposed of at one of the on-site landfills. When the incinerator was dismantled, it was disposed of in Landfill No. 1 (Weston, 1992). No investigations have been performed for this site previous to the Preliminary SI; however, the PA recommended that the soil be inspected for evidence of other materials possibly being burned at this location.

3.5.2 Extent of Contamination

AREE 20 was included in the initial SI field work completed by EARTH TECH in the Fall of 1993. A shallow area was excavated to observe soil conditions. No stained soils were observed, therefore no samples were collected.

3.5.3 Proposed Sampling Activities and Analysis

Four surface soil samples will be obtained at AREE 20. The soil samples will be analyzed for VOCs, metals, BNAs, PCB/pesticides, TPH, and dioxin. The location of AREE 20 and proposed sampling locations are depicted on Figure 3-1.

3.6 AREE 21 - Former Storage Area (Building 211)

3.6.1 Site Description and History

AREE 21 is an area to the east of Building 211 which was used as a storage yard prior to Building 211's construction in 1979. (It appears that part of AREE 21 is now actually under Building 211.) Reportedly, transformers and capacitors containing PCBs were stored within this AREE prior to their disposal. Soil samples were collected at AREE 21 for the Preliminary SI and Phase I SI.

3.6.2 Extent of Contamination

The Preliminary SI sampling program collected four composite soil samples from within the limits of this AREE. No PCBs were detected. However, TPH was detected within

each composite sample, at levels ranging from 30 to 55 ppm. Soil samples were collected as part of the Phase I SSI at AREE 21. Inorganics and di-n-octyl phthalate were detected.

3.6.3 Proposed Sampling Activities and Analysis

AREE 21 will be included in the PCB screening (discussed in Section 4.0). A confirmation soil sample will be collected. The soil sample will be analyzed for VOCs, BNAs, metals, PCB/pesticides, and TPH. The proposed sample location is depicted on Figure 3-1.

3.7 AREE 29 - VEPCO TRANSFORMER SPILL

3.7.1 Site Description and History

An electrical substation is located at the Dawson Beach Road entrance to the installation, immediately opposite from Building 101 (Figure 3-2). Prior to January 1984, one (or more) PCB-contaminated pole-mounted transformers owned by the Virginia Electrical Power Company (VEPCO), was located within this substation. One of these transformers failed in January 1984, resulting in a leak of PCB-contaminated dielectric fluid within the general area of this substation.

According to a 21 December 1993 letter provided by VEPCO to the installation, 450 gallons of PCB-contaminated transformer oil was shipped from WRF on 25 January 1984. In addition to the oil, 15 drums of PCB-contaminated soil and one drum of PCB-contaminated rags and filters were removed on that date. In 1993, a VEPCO representative collected two soil samples from the site for chemical analysis. A letter dated 21 December 1993 reports the samples contained PCBs at concentrations of "0.01 and 0.02 ppm".

3.7.2 Extent of Contamination

The extent of contamination, if any, is unknown.

3.7.3 Proposed Sampling Activities and Analysis

Surface soil samples will be screened for PCBs using the method discussed in Section 4.0. Additionally, three surface soil samples will be obtained downgradient from the VEPCO substation. The surface soil samples will be analyzed for VOCs, metals, BNAs, TPH, and PCB/pesticides. The location of AREE 29 and proposed sampling locations are depicted on Figure 3-2.

3.8 AREE 30 - HYDRAULIC OIL SPILL

3.8.1 Site Description and History

In May 1993, a mobile crane was involved in a oil spill in an equipment staging area located on the north side of Dawson Beach Road, near the intersection with Lake Drive. Reportedly, a hydraulic line failed while the crane was in the process of loading excess equipment onto a trailer for offsite disposal. Approximately 50 gallons of hydraulic oil was lost from the crane.

3.8.2 Extent of Contamination

The installation's facilities engineering staff responded promptly with empty drums and absorbent pads. Approximately 15 tons of contaminated soil was collected and stockpiled, and disposed of offsite on 1 November 1993. The extent of contamination is unknown at this AREE. There was no sampling of the non-stained soil, but because of the quick remedial action, it is unlikely that any significant residual contamination remains.

3.8.3 Proposed Sampling Activities and Analysis

Four surface soil samples will be obtained at AREE 30. The soils will be analyzed for VOCs, metals, BNAs, TPH, and PCB/pesticides. AREE 30 and proposed sample locations are depicted on Figure 3-2.

3.9 AREE 33 - BULLDOZER FUEL SPILLS

3.9.1 Site Description and History

In January 1990, approximately 100-gallons of water-contaminated diesel fuel was drained from a bulldozer in an area to the west of the fenced compound. Approximately 100 tons of contaminated soil was excavated and placed on absorbent material over plastic sheeting. Soil was taken offsite by Spill Safe Testing and incinerated.

3.9.2 Extent of Contamination

The extent of contamination is unknown at this AREE. There was no sampling of the non-stained soil, but because of the quick remedial action, it is unlikely that any significant residual contamination remains.

3.9.3 Proposed Sampling Activities and Analysis

Four surface soil samples will be obtained at AREE 33. The soil will be analyzed for VOCs, metals, BNAs, TPH, and PCB/pesticides.

3.10 AREE 34 - Hunter Qualification Target Range

3.10.1 Site Description and History

AREE 34 is located in a 100-feet wide by 200 yard area east of the main compound and south of Charlie Road (Figure 3-2). This area is used once a year to qualify approximately 100 hunters to deer hunt in WRF. Each hunter is allowed to shoot 5 slugs into the targets. ARL initiated this policy two years ago.

3.10.2 Extent of Contamination

The extent of contamination, if any, is unknown. Samples have not been collected at the AREE.

3.10.3 Proposed Sampling Activities and Analysis

Four surface soil samples will be obtained at AREE 34. The surface soil samples will be analyzed for VOCs, metals, BNAs, and PCB/pesticides. The location of AREE 34 and proposed soil samples is depicted on Figure 3-2.

3.11 AREE 35 - Former Antenna Field Sites

3.11.1 Site Description and History

When the WRF was initially acquired by the Army in 1951, the installation was placed into service as a radio transmitting station. A variety of large antenna arrays were installed that occupied most of the installation's undeveloped acreage. An electrical power distribution system was in place in support of the enormous power requirements necessary to energize the antenna arrays.

Transformers and capacitors are normally associated with electrical power distribution systems. During the 1950's and 1960's, at least two banks of transformers were installed and in service at the WRF; this information is based on anecdotal reports that may not be accurate. Although not known for certain, it is likely that these transformers contained PCBs as a dielectric fluid. These transformers were located adjacent to the western and southern fenceline at the Main Compound.

In addition to these power distribution transformers, there were smaller transformers associated with the individual antenna arrays. The balance-unbalance transformers, known as "baluns", were in reportedly in service at remote locations at the antenna fields. There are anecdotal reports that lightning would periodically strike the antenna fields, and that these baluns would explode in a shower of sparks.

It is possible that PCBs from these transformers and baluns may have contaminated the soil and groundwater. In order to evaluate and track this concern, AREE 35 was created by the BCT in mid-1994.

3.11.2 Extent of Contamination

The extent of contamination, if any exists, is unknown at AREE 35.

3.11.3 Proposed Sampling Activities and Analysis

AREE 35 will be included in the PCB screening (as discussed in Section 4.0). Twelve surface soil samples will be collected from locations that test positive and from locations that test negative for PCBs during screening. Confirmation soil samples will be analyzed for VOCs, BNAs, TPH, PCB/pesticides and metals. AREE 35 is shown on Figure 3-2.

3.12 AREE 38 - NVCC STUDY AREA

3.12.1 Site Description and History

In July 1994, the BCT was made aware that a class of students from the Northern Virginia Community College (NVCC) had taken soil samples from the southern boundary of the installation, generally along the fenceline adjacent to the Marumsco Creek National Wildlife Refuge. The students analyzed the soil samples as a part of an educational exercise and reported mercury contamination in the soil, with one elevated concentration of approximately 350 ppm.

On October 19, 1994, Ms. Linda Melton, a member of the Restoration Advisory Board and a teacher at Garfield High School, reported that her students had detected a positive result with a field test kit for metals. On December 7, 1994, the BCT agreed that sampling should be performed by the Army to resolve this concern, therefore AREE 38 was included in the SSI.

3.12.2 Extent of Contamination

The extent of contamination, if any exists, is unknown at AREE 38.

3.12.3 Proposed Sampling Activities and Analysis

Proposed sampling at AREE 38 includes the collection of five surface soil samples for VOCs, metals, BNAs, TPH, and PCB/pesticides analysis. AREE 38 and proposed sampling locations are depicted on Figure 3-2.

3.13 AREE 39 - DEBRIS PILES

3.13.1 Site Description and History

On 10 January 1995, during the course of an installation-wide site walk, the BCT noted piles of metallic debris, construction material, and unidentified piles of soil located within the general area to the south of AREE 34, the Hunter Qualification

Target Range. At the BCT meeting that occurred at the WRF on 21 February 1995, it was agreed that these debris piles are a potential concern, and that they should be designated as an AREE.

3.13.2 Extent of Contamination

The extent of contamination, if any exists, is unknown at AREE 39.

3.13.3 Proposed Sampling Activities and Analysis

Proposed sampling at AREE 39 includes the collection of five surface soil samples to be analyzed for VOCs, BNAs, PCB/pesticides, TPH, and metals. The soil samples will be collected with a hand auger to a depth of 3 feet. PCB screening will also be conducted on three surface soil samples. The location of AREE 39 and proposed sampling locations are depicted on Figure 3-2.

3.14 AREE 40 - Former Water Tower

3.14.1 Site Description and History

At the BCT Meeting that occurred at the WRF on 21 February 1995, the USEPA member of the BCT reported concerns at other installations that relate to paint-stripping activities at water towers. It is reported that elevated levels of lead have been noted at other installations. The BCT agreed to designate the location of the former water tower, at the southeast corner of Building 201, as AREE 40.

3.14.2 Extent of Contamination

The extent of contamination, if any exists, is unknown at AREE 40.

3.14.3 Proposed Sampling Activities and Analysis

Proposed sampling at AREE 40 includes the collection of one surface soil sample for VOCs, BNAs, TPH, PCB/pesticides, and metals. AREE 40 and proposed sampling locations are shown on Figure 3-1.

SECTION 4.0
PCB SCREENING

4.1 PCB SCREENING LOCATIONS

The BCT requested a PCB survey be conducted in areas associated with former antenna field sites (AREE 35), the main surface water drainage ditch (AREE 22), former transformer yards, and other potentially PCB-contaminated areas at WRF.

AREE 22 (Drainage Ditch) was included in the SI. PCBs were not identified as chemicals of concern in previous investigations prior to the SI, therefore samples collected in the ditch during the SI were not analyzed for PCBs. A sampling program conducted by VADEQ detected PCBs at 1.5 parts per billion in the effluent and 96 ppm a sediment sample collected at the outfall of an oil/water separator (AREE 11) into a ditch located behind Building 202 (VADEQ, 1994). PCBs were also detected in sediments from the ditch, ranging from 5 to 100 ppm.

The BCT identified the following locations to be included in the PCB field screening:

- ★ "PCB hot spot" near AREE 17
- ★ Main Drainage Ditch (AREE 22)
- ★ Former Antenna Fields (AREE 35)
- ★ Reported former transformer banks along south side of the Main Compound fence
- ★ Reported former transformer site in a swale
- ★ Two Former Transformer Yards (Building 201) (AREE 15)
- ★ Road beds outside Main Compound
- ★ Former Transformer Storage Yard (behind Building 211) (AREE 21)
- ★ Sewage injection area along Belmont Bay
- ★ Culverts along perimeter fence
- ★ VEPCO Spill Area (AREE 29)
- ★ Conduit Disposal Piles (AREE 39).

All screening locations are shown on Figure 4-1.

4.2 PCB SCREENING PROCEDURE

The PCB soil screening samples will be obtained in a phased approach in order to evaluate preliminary data and optimize sampling locations and resources. The samples will be analyzed with D TECH® PCB field screening test kits. Ten percent of the field

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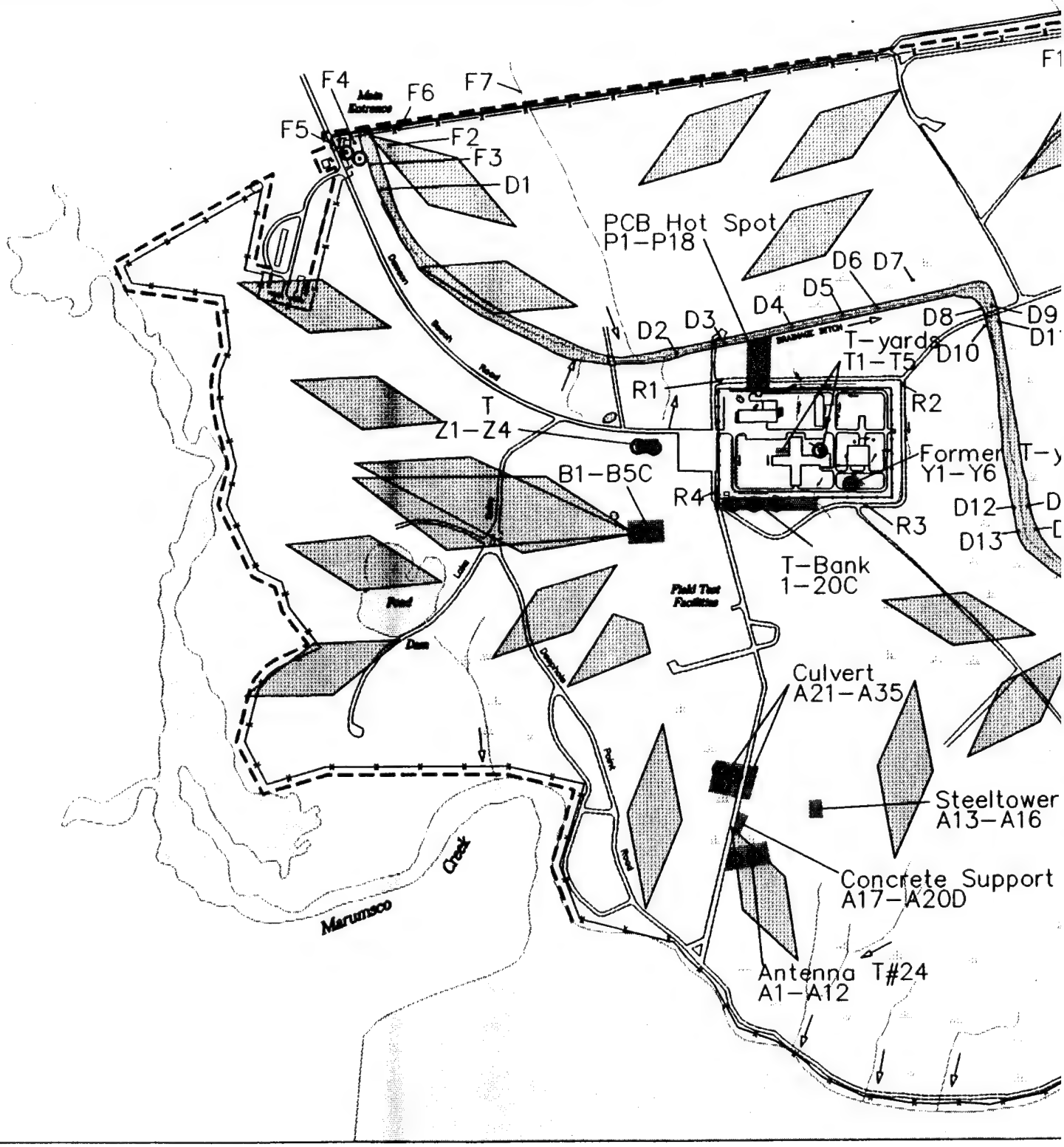


Installation Boundary

Site Boundary

Water Flow Direction

Confirmation Location

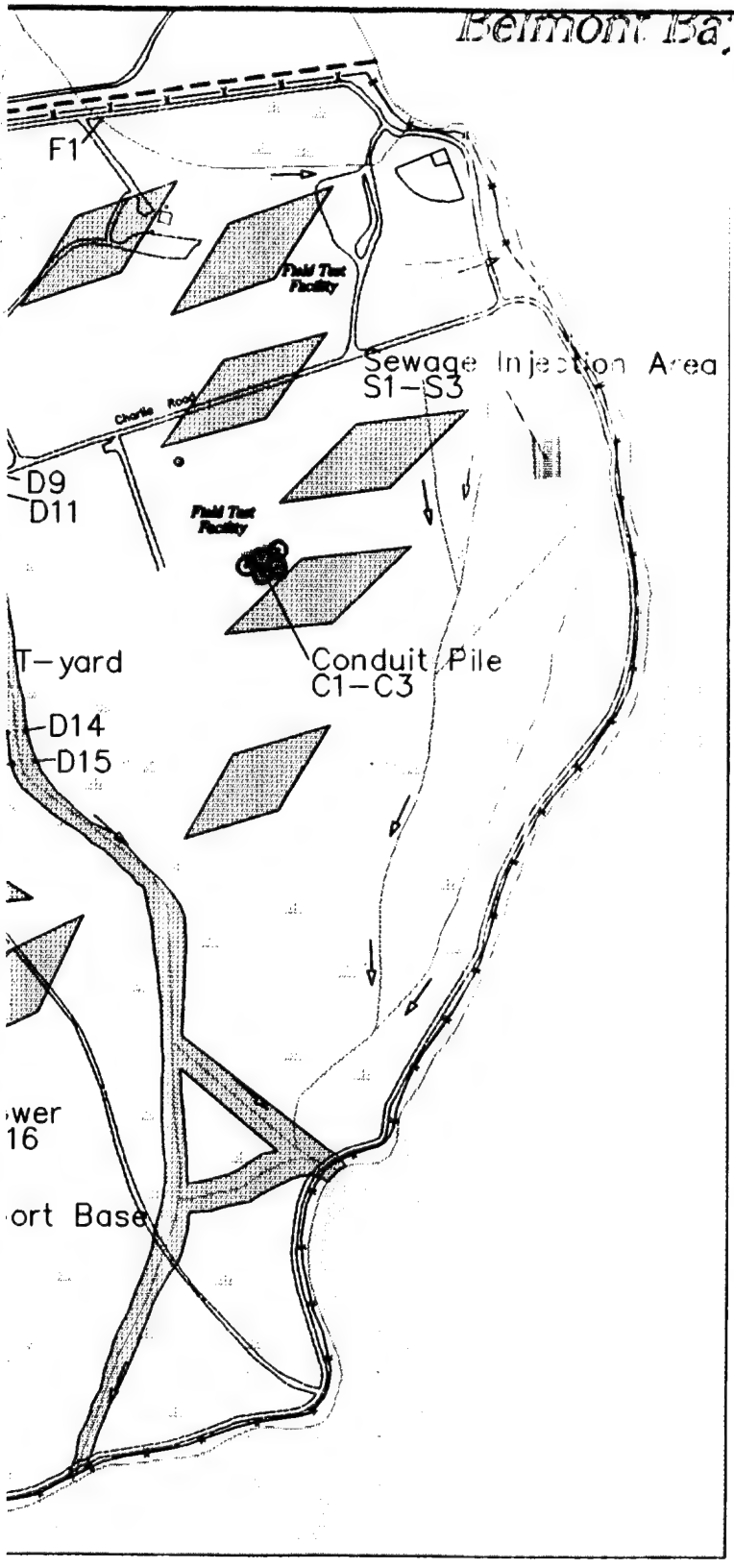
AREE 35 Antenna Field

GC Grid Composite Samples

G Grab Samples

T Transformers

PCB screening results repor



Sample Location	
FORMER ANTENNA - FACILITY WIDE	
Suspect Transformer (24)	
A1 - A8	<0.5 GC
A9	0.5-1.0 GC
A9A - A12	<0.5 GC
Steel Tower	
A13 - A16	<0.5 GC
Concrete Support Base	
A17 - A19	<0.5 GC
A20	0.5 - 1.0 GC
A20A	1 - 4 GC
A20B	<0.5 GC
A20C	0.5 - 1.0 GC
A20D	<0.5 GC
A20A-1 - A20A-4 Grid 20	<0.5 G
A20A-C Grid 20	<0.5 G
Antenna Array	
A21	1 - 4 GC
A21-1 - A21-3 Confirm A21	<0.5 G
A21-4 Confirm A21	0.5 - 1.0 G
A21-C Confirm A21	0.5 - 1.0 G
A23	0.5 - 1.0 GC
A23-5 Confirm A23	<0.5 G
A23-6 Confirm A23	0.5 - 1.0 G
A23-C Confirm A23	<0.5 G
A24 - A26	<0.5 GC
A27	0.5 - 1.0 GC
A28 - A29	<0.5 GC
A30	>50 GC
A30-7 - A30-8 Confirm A30	<0.5 G
A30-C Confirm A30	<0.5 G
A31 - A32	0.5 - 1.0 GC
A33 - A35	<0.5 GC
Antenna Array	
B1 - B3	<0.5 GC
B4	0.5 - 1.0 GC
B5	4 - 15 GC
B5-1 Confirm B5	1 - 4 G
B5-2 Confirm B5	0.5 - 1.0 G
B5-3 Confirm B5	<0.5 G
B5-4 Confirm B5	1 - 4 G
B5-C Confirm B5	<0.5 G
B6-B8	<0.5
FORMER TRANSFORMER STORAGE YARD	
Y1 - Y4	<0.5 GC
Y5	1 - 4 GC
Y5-1 - Y5-3 Confirm Y-5	<0.5 G
Y5-C Confirm Y-5	<0.5 G
Y6	0.5 - 1.0 GC
POSSIBLE TRANSFORMER SITE	
Z1 - Z2	<0.5 GC
Z3	1 - 4 GC
Z3-1 Confirm Z3	1 - 4 G
Z3-2 Confirm Z3	<0.5 G
Z3-3 Confirm Z3	1 - 4 G
Z3-C Confirm Z3	<0.5 G
Z4	0.5 - 1.0 GC

Sample Location	
CONDUIT PILE - SOUTH OF FIRING RANGE	
C1 - C3	<0.5 G
AREE 22 - MAIN DRAINAGE CHANNEL	
D1	0.5 - 1.0 G
D2	<0.5 G
D3	0.5 - 1.0 G
D4	0.5 - 1.0 G
D5	<0.5 G
D6	1 - 4 G
D7 - D15	<0.5 G
NORTHERN FENCELINE	
F1	<0.5 G
F2	1 - 4 G
F3 - F5	0.5 - 1.0 G
F6 - F7	<0.5 G
AREE 11	
P1 - P3	<0.5 G
P4	1 - 4 G
P5	<0.5 G
P6	4 - 15 G
P6A - P9	<0.5 G
P10 - P11	>50 G
P12	4 - 15 G
P13 - P15	<0.5 G
P16	>50 G
P17 - P18	<0.5 G
ON ROADWAYS	
R1 - R2	1 - 4 G
R1-A Replicate R1	<0.5 G
R2-A Replicate R2	1-4 G
R3 - R4	<0.5 G
FORMER SEWAGE INJECTION - SOUTH OF CHARLIE ROAD	
S1 - S3	<0.5 GC
TRANSFORMER YARDS	
T1	<0.5 GC
T2	0.5 - 1.0 GC
T3 - T5	<0.5 GC
TRANSFORMER "BANK" - SE FENCLEINE OF MAIN COMPOUND	
1 - 6	<0.5 G
7	0.5 - 1.0 G
8	<0.5 G
9	1 - 4 G
10	0.5 - 1.0 G
11	0.5 - 1.0 G
12 - 17	<0.5 G
18	1 - 4 G
19	<0.5 G
20	15 - 50 G
20A Replicate 2	<0.5 G

0 350 700

SCALE IN FEET

eported in parts per million (PPM)

EARTH TECH

FIGURE 4-1

PCB SCREENING AND CONFIRMATION LOCATIONS

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screened soil samples will be duplicated and sent to an AEC-approved laboratory for analysis and confirmation of the test kit results.

Due to the large areal extent covered by the antenna array, a sampling grid system will be utilized in order to obtain a more representative sample. A 20 foot by 20 foot square will be utilized to establish a grid pattern at each sampling location. Samples will be collected from the center and four sides of each square in the grid and composited into one sample. Perimeter sampling of adjacent grid squares will be conducted to minimize replicate sampling. Sample locations will be entered into a map file for the IRDMIS database.

PCB field screening will be conducted with the D TECH® Field Test Method. The D TECH® PCB field test kit is based on an immunoassay analysis. Immunoassay is a technology recognized by the USEPA as a valuable field screening tool. The EPA's Office of Solid Waste (OSW) has issued immunoassay methods for analyses performed under the Resource Conservation and Recovery Act (RCRA). The method for PCBs has been incorporated into SW-846 as Method 4020. The field test results correlate to EPA SW-846 Method 8080.

For the D TECH® PCB field test kit, antibodies specific to PCB are linked to latex particles. PCB molecules present in the sample are captured by these latex particles and collected on the membrane surface of the collection device. A color developing solution is then added, and the presence (or absence) of PCB can be measured with the hand-held DTECHTOR meter for semiquantitative results.

4.3 Confirmation Location

Confirmation soil samples are included in Section 3.0 as part of the proposed sampling activities and analysis at AREEs 15, 21, 29, 35, and 39. These confirmation samples are based on screening results. Confirmation and screening locations as well as screening results are shown on Figure 4-1.

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SECTION 5.0
REFERENCES

EARTH TECH, March 1994. Final Work Plan for Woodbridge Research Facility.

EARTH TECH, 1995. Site Inspection Report, Woodbridge Research Facility.

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U.S. Army Corps of Engineers, 1995. IRDMIS User's Guide, Volume II, Data Dictionary.

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APPENDIX A

IRDMIS MAP FILE

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F SITE TYPE	F SITE ID	F X COOR	F Y COOR	F_SYSTEM	F_ACCSRC	F_ACCEXPO	F ELEV
OTFL	A17-1	305277	4279700	U	M	9	0.0
OTFL	A17-2	305275	4279703	U	M	9	0.0
OTFL	A17-3	305277	4279710	U	M	9	0.0
BORE	A20-1	305360	4279500	U	M	9	0.0
BORE	A20-2	305370	4279500	U	M	9	0.0
BORE	A20-3	305360	4279510	U	M	9	0.0
BORE	A20-4	305370	4279510	U	M	9	0.0
DTCH	A29-1	304600	4280030	U	M	9	0.0
DTCH	A29-2	304610	4280035	U	M	9	0.0
DTCH	A29-3	304615	4280035	U	M	9	0.0
GRAB	A30-1	305040	4279620	U	M	9	0.0
GRAB	A30-2	305060	4279610	U	M	9	0.0
GRAB	A30-3	305060	4279625	U	M	9	0.0
GRAB	A30-4	305080	4279615	U	M	9	0.0
GRAB	A33-1	305010	4279475	U	M	9	0.0
GRAB	A33-2	305020	4279465	U	M	9	0.0
GRAB	A33-3	305025	4279478	U	M	9	0.0
GRAB	A33-4	305030	4279470	U	M	9	0.0
GRAB	A34-1	305915	4279705	U	M	9	0.0
GRAB	A34-2	305930	4279705	U	M	9	0.0
GRAB	A34-3	305930	4279720	U	M	9	0.0
GRAB	A34-4	305915	4279720	U	M	9	0.0
BORE	A18-1	305240	4279515	U	M	9	0.0
BORE	A18-2	305260	4279515	U	M	9	0.0
COMP	A35-1	305360	4279450	U	M	9	0.0
COMP	A35-2	305360	4279450	U	M	9	0.0
COMP	A35-3	305360	4279450	U	M	9	0.0
COMP	A35-4	305360	4279450	U	M	9	0.0
COMP	A35-5	305360	4279450	U	M	9	0.0
COMP	A35-6	305360	4279450	U	M	9	0.0
COMP	A35-7	305360	4279450	U	M	9	0.0
COMP	A35-8	305360	4279450	U	M	9	0.0
COMP	A35-9	305360	4279450	U	M	9	0.0
COMP	A35-10	305360	4279450	U	M	9	0.0
COMP	A35-11	305360	4279450	U	M	9	0.0
COMP	A35-12	305360	4279450	U	M	9	0.0
GRAB	A37-1	305360	4279450	U	M	9	0.0
GRAB	A37-2	305360	4279450	U	M	9	0.0
GRAB	A37-3	305360	4279450	U	M	9	0.0
GRAB	A37-4	305360	4279450	U	M	9	0.0
GRAB	A37-5	305360	4279450	U	M	9	0.0
GRAB	A38-1	305070	4278825	U	M	9	0.0
GRAB	A38-2	305070	4278825	U	M	9	0.0
GRAB	A38-3	305070	4278825	U	M	9	0.0
GRAB	A38-4	305070	4278825	U	M	9	0.0

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